EIGHTH PROGRESS REPORT

on

STRESSES AND DEFORMATIONS IN THIN
SHELLS OF REVOLUTION

to

National Aeronautics and Space Administration

under

NASA Research Grant NsG-274   (S 1 and 2)

Faculty Investigators

E. P. Popov
J. Penzien

University of California
Office of Research Services
July 6, 1966

Eighth Progress Report on

STRESSES AND DEFORMATIONS IN THIN
SHELLS OF REVOLUTION

Introduction

The objective of this investigation continues to be the development
of methods of analysis for thin shells of revolution. Non linear prop-
erties of materials and dynamic response received particular attention
during this report period.

Progress during the report period

During the past six months, the following activity associated with
the project may be noted:

1. A report on "Finite Element Solution of Axisymmetrical

Dynamic Problems of Shells of Revolution" by H. Y. Chow and

E. P. Popov has been completed and sent to NASA under separate

cover and is a part of this progress report. Excerpts of some of

the results were prepared as an Addendum by E. P. Popov and H. Y.

Chow to the paper on "The Linear Elastic Dynamic Analysis of Shells

of Revolution by the Matrix Displacement Method" by Stanley Klein

and Richard J. Sylvester. This work is scheduled to appear in the

Proceedings of the October 1965 Conference on Matrix Methods in

Structural Mechanics, Wright-Patterson AFB, Ohio.

2. A report on "A Bending Analysis of Elastic-Plastic Circular
Plates" by M. Khojasteh-Bakt, S. Yaghmai, and E. P. Popov has
been completed and copies will be sent to NASA as soon as
available to be a part of this progress report. A presentation
on this work has been given at the 5th U. S. National Congress
of Applied Mechanics at the University of Minnesota on June 16,
1966. A synopsis is published in the Proceedings (Published on
behalf of the Congress by ASME, see p. 583). In this work the
incremental laws of plasticity are used in determining stress
distribution and deformation. Extension of the developed
procedure to axisymmetrically loaded shells of revolution
appears possible.

3. Some preliminary studies were made on the possibility of
achieving dynamic solutions for shells of revolution with trans-
verse shear effects.

4. Some work was done on the preparation of two papers "Analysis
of Elastic-Perfectly Plastic Circular Plates" and "Bending of
Circular Plates of Hardening Material" based on the report of
item 2 above. It is intended to submit these papers for pub-
lication in a technical journal.

Budget

A budgetary statement on this project will be sent separately after
the June expenses are reported.